Measurement Exercise “Gamma Spectrometry”

ITU, Karlsruhe , 10th Feb. 2009

NUCLEONICA:
A WEB PORTAL FOR THE NUCLEAR SCIENCES

J. MAGILL

European Commission, Joint Research Centre,
Institute for Transuranium Elements,
Postfach 2340, 76125 Karlsruhe, Germany

nucleonica

NUCLEONICA:SNAP Science Networking and Applications Portal

1. What is Nucleonica? Underlying philosophy
2. Nucleonica web portal www.nucleonica.net
3. Social networking aspects
4. Nuclear science applications
5. Training courses
6. Karlsruhe Nuclide Chart
7. Future developments: SciencePipes

Knowledge and Learning: Overview

Knowledge and learning have been the subject of study for centuries. Aristotle differentiated between various types of knowledge and how they are acquired. In the eighteenth century, Adam Smith developed a theory of knowledge to be gained through "division of labour" and based on repeating well defined tasks. However, since the early 1990s, the "knowledge economy" or "knowledge society" has gained increasing attention in management circles with many large organizations engaging in a range of knowledge and learning activities. Some of the reasons for these developments are as follows…

NUCLEONICA: A Platform for Knowledge Management, Education and Training

Knowledge and Learning: Overview…

1. The realization that the Western world (and Japan) were increasingly producing and profiting more and more from services and making fewer tangible goods. This substantial economic shift was a result of manufacturing moving to "less developed" nations because of lower costs.

2. Increasing importance is being given to an organization's competences and capabilities rather than material and financial resources. As a consequence, organizations began to realize that their most valuable resource could be found in the brains of their employees.

3. The impact of the "learning by doing" school of thought (Constructionism), on how expertise develops in practice.

4. The geographically dispersed nature of organizations which leads to the formation of virtual teams operating in a cyber-environment.

5. Knowledge related technologies i.e. the proliferation of knowledge and learning tools. However, technology driven approaches (pushed by vendors of software for example) need to be used with care to ensure that they play only a subordinated role in the management of people and processes.

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NUCLEONICA: A Platform for Knowledge Management, Education and Training

Types of Knowledge : Explicit vs. Tacit

It is generally accepted that different types of knowledge have very different characteristics. Explicit knowledge, for example, consists of facts, sets of instructions, etc. Implicit knowledge, on the other hand, is more related to know-how. These different types of knowledge have, of course, very different characteristics with regard, for example, to transferability. Explicit knowledge is transferable from person to person, across space and time. In contrast, tacit knowledge cannot be easily articulated and its transfer is slow and uncertain. As a consequence, explicit knowledge is not the basis of sustainable advantage over other organisations (except in the form of copyrights, patents, etc.). It is more the tacit knowledge that fits this role and this is notoriously difficult to transfer - even within the organization itself.

nucleonica

Nucleonica…

nucleonica … web driven nuclear science

Sunday, November 18, 2007

Home | username ••••••••• Login

- Welcome
- Products & Prices
- Free Access
- Training Courses
- Educational Resources
- Karlsruhe Nuclide Chart
- News Releases
- Ask an Expert
- About Us
- Contact

Nucleonica - web driven nuclear science

NUCLEONICA is a new nuclear science web portal from the European Commission's Joint Research Centre. The portal provides a customisable, integrated environment and collaboration platform for the nuclear sciences using the latest internet "Web 2.0" dynamic technology.

NUCLEONICA is aimed at professionals, academics and students working with radionuclides in fields as diverse as the life sciences (e.g. biology, medicine, agriculture), the earth sciences (geology, meteorology, environmental science) and the more traditional disciplines such as nuclear power, health physics and radiation protection, nuclear and radiochemistry, and astrophysics. It is also used as a knowledge management tool to preserve nuclear knowledge built up over many decades by creating modern web-based versions of so-called legacy computer codes.

NUCLEONICA provides "software as a service" on the web rather than through installed software, adding a greater level of stability and security and avoiding version compatibility and update problems. In addition, all **NUCLEONICA's** web applications are browser and operating system independent and can therefore be accessed by most web browsers.

NUCLEONICA offers the following main features:

» **Data Centre:** Online interactive nuclide charts. Reference data and searchable databases for internationally evaluated nuclear data. Library creation software

NUCLEONICA HOT TOPICS

» Open Call for JRC Traineeships

November 14, 2007

ITU's first open call for JRC-Traineeships has been published on our website. The deadline for applications is 6 December 2007 (midnight). In particular we have a position for assistance in the development of an electronic version of the Karlsruhe

JRC EUROPEAN COMMISSION

Institute for Transuranium Elements

NUCLEAR NEWS

French FM: France is not ruling out a military strike on Iran

NOV 18 Even though in Tehran the IAEA's report was described as a "political victory" that may prevent the intensifying of international sanctions, Kouchner says that "for now Iran persists in not meeting it […]

Iran: UNSC interference illegal

NOV 18 Mohammad Saeedi, a senior Iranian nuclear official has said insistence on pursuing Iran's nuclear program at the Security Council lacks legal grounds, PressTV reported. […]

Iran says ready to act if attacked …

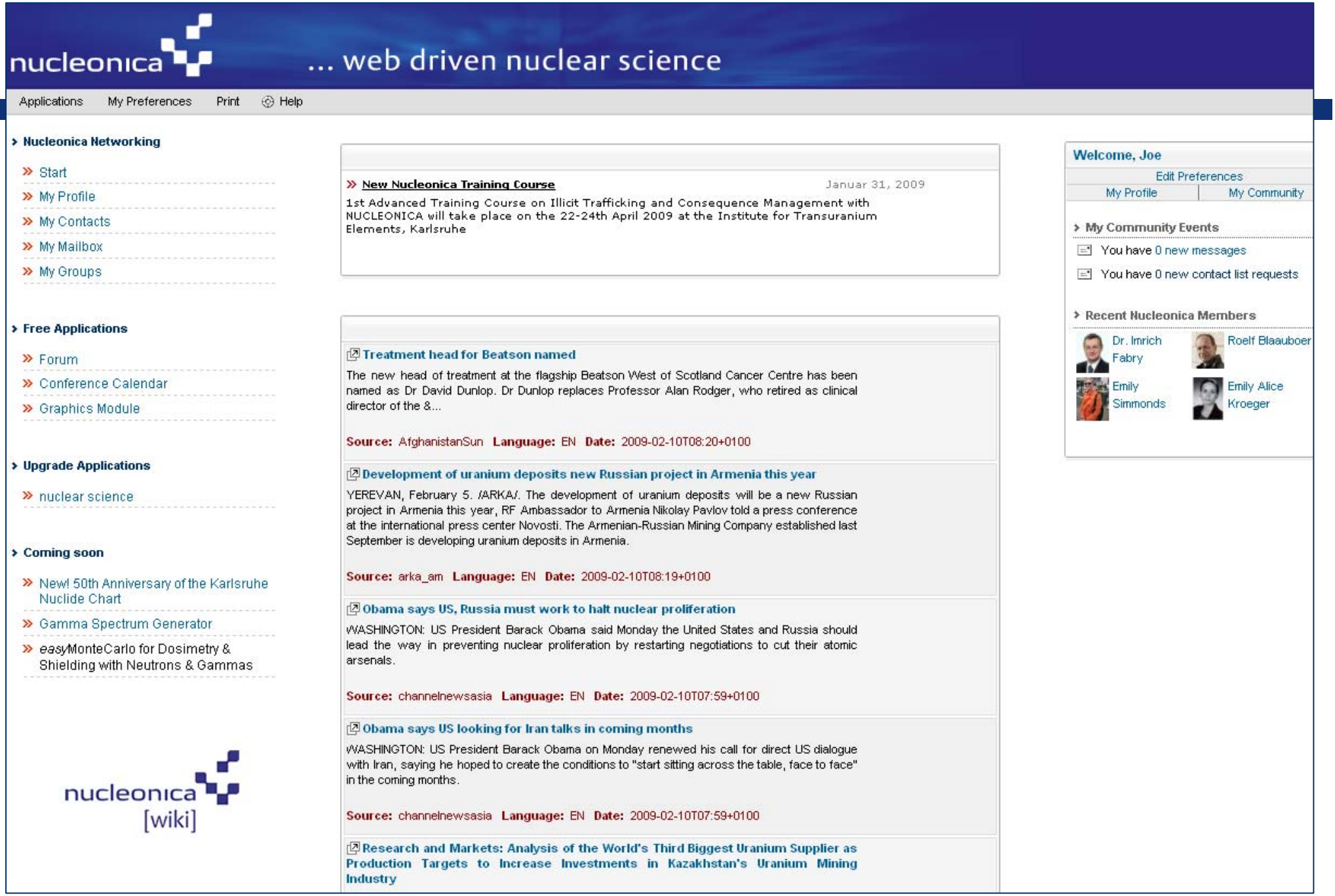
NOV 18 LONDON, November 18 (IranMania) - Hardline Iranian President Mahmoud Ahmadinejad said Iran was ready to respond if attacked, but played down the prospect of war with the United States, Reuters reporte […]

'Safe' uranium that left a town contaminated

NOV 18 It is 50 years since Tony Ciarfello and his friends used the yard of a depleted uranium weapons factory as their playground in Colonie, a suburb of Albany in upstate New York state. "There wasn't no f […]

Chavez dealing pain to Spain

NOV 18 Chavez, who has nationalised large parts of the economy this year under his self-styled socialist "revolution", said last week he will revise diplomatic and business ties with the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... web driven nuclear science
Applications
My Preferences
Print
Help
Nucleonica Networking
Start
My Profile
My Contacts
My Mailbox
My Groups
Free Applications
Forum
Conference Calendar
Graphics Module
Upgrade Applications
nuclear science
Coming soon
New! 50th Anniversary of the Karlsruhe Nuclide Chart
Gamma Spectrum Generator
easyMonteCarlo for Dosimetry & Shielding with Neutrons & Gammas
nucleonica [wiki]
New Nucleonica Training Course
Januar 31, 2009
1st Advanced Training Course on Illicit Trafficking and Consequence Management with NUCLEONICA will take place on the 22-24th April 2009 at the Institute for Transuranium Elements, Karlsruhe
Treatment head for Beatson named
The new head of treatment at the flagship Beatson West of Scotland Cancer Centre has been named as Dr David Dunlop. Dr Dunlop replaces Professor Alan Rodger, who retired as clinical director of the &...
Source: AfghanistanSun Language: EN Date: 2009-02-10T08:20+0100
Development of uranium deposits new Russian project in Armenia this year
YEREVAN, February 5. /ARKA/. The development of uranium deposits will be a new Russian project in Armenia this year, RF Ambassador to Armenia Nikolay Pavlov told a press conference at the international press center Novosti. The Armenian-Russian Mining Company established last September is developing uranium deposits in Armenia.
Source: arka_am Language: EN Date: 2009-02-10T08:19+0100
Obama says US, Russia must work to halt nuclear proliferation
WASHINGTON: US President Barack Obama said Monday the United States and Russia should lead the way in preventing nuclear proliferation by restarting negotiations to cut their atomic arsenals.
Source: channelnewsasia Language: EN Date: 2009-02-10T07:59+0100
Obama says US looking for Iran talks in coming months
WASHINGTON: US President Barack Obama on Monday renewed his call for direct US dialogue with Iran, saying he hoped to create the conditions to "start sitting across the table, face to face" in the coming months.
Source: channelnewsasia Language: EN Date: 2009-02-10T07:59+0100
Research and Markets: Analysis of the World's Third Biggest Uranium Supplier as Production Targets to Increase Investments in Kazakhstan's Uranium Mining Industry
Welcome, Joe
Edit Preferences
My Profile
My Community
My Community Events
You have 0 new messages
You have 0 new contact list requests
Recent Nucleonica Members
Dr. Imrich Fabry
Roelf Blaauboer
Emily Simmonds
Emily Alice Kroeger

Community Members | Pending Contacts

all Users

my Contacts

Image	Name	Organization
	MARTINA ADORNI	University of Pisa - DIMNP - GRNSPG
	Aleksandra Schwenk-Ferrero	Forschungszentrum Karlsruhe - Institute for
	Mikael Andersson	Westinghouse Electric Sweden AB
	Martin Badertscher	
	Remigiusz Baranczyk	European Commission DG TREN
	Enrico Barbina	Nabla Progetti Srl
	Valerio Barbina	Nabla Progetti Srl
	Bjoern Becker	Forschungszentrum Karlsruhe GmbH, Institu
	Fabio Belloni	European Commission, DG-JRC, Institute fo
	Andrey Berlizov	Institute for Transuranium Elements, EC JRC
	Yuri Bilodid	Forschungszentrum Dresden-Rossendorf
	Emilie BOSSE	CEA
	Berkan Cetinkaya	Ege University, Institute of Nuclear Sciences
	Vanessa Chisté	
	Catalina Chitu	

Profile | Contacts

Simon Jerome National Physical Laboratory

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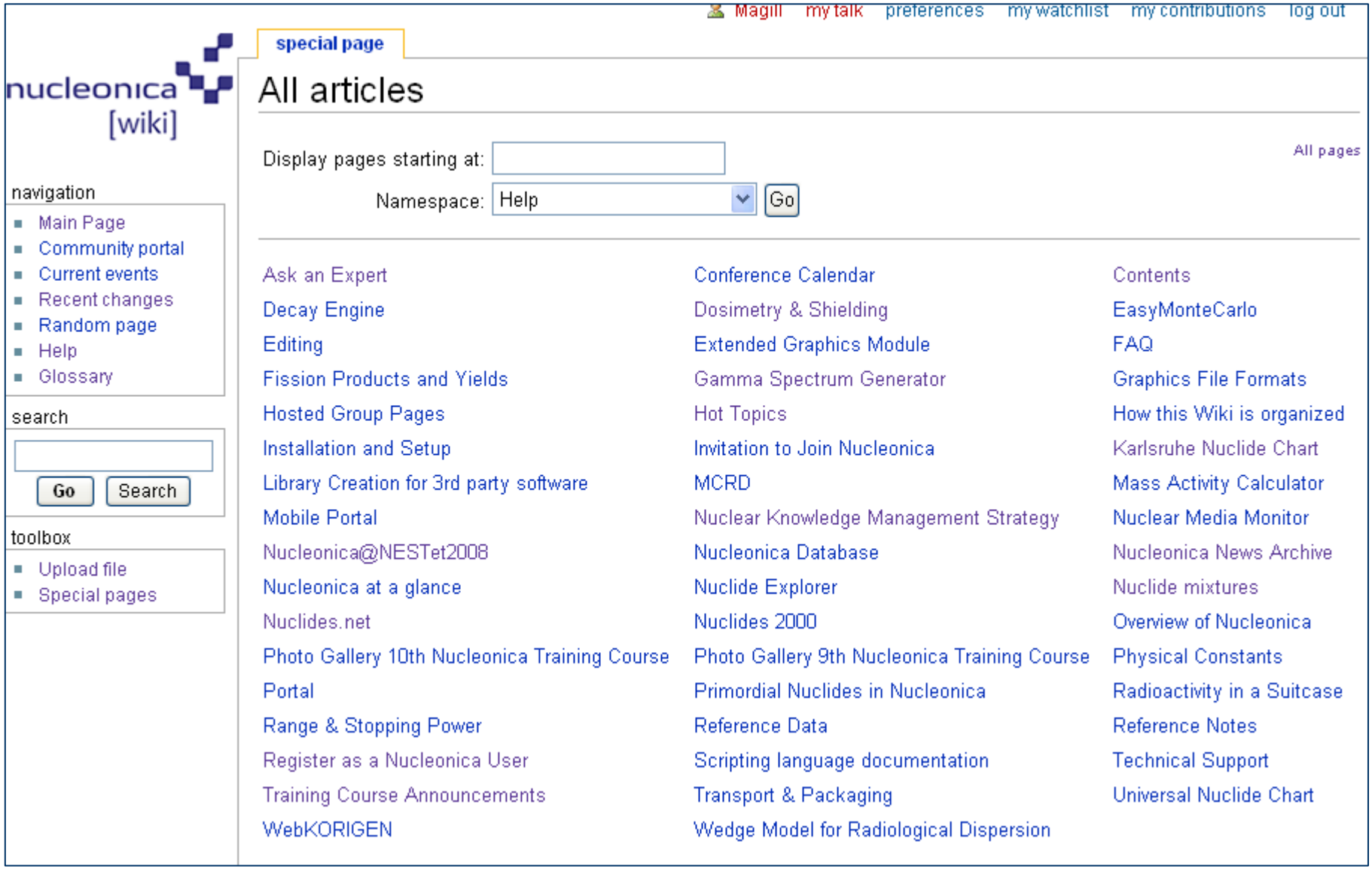
Name	Simon Jerome
Location	United Kingdom
Nationality	British
Organization	National Physical Laboratory
Job Title	Head of Radiochemistry
Areas Of Interest	Radiochemistry; Analytical Chemistry; Radiochemical Analysis; Low-level radioactivity measurement; Inter-laboratory comparisons and proficiency testing; ISO 17025:2005 Technical Assessor; ISO Guide 43
E-Mail	simon.jerome@npl.co.uk

Organization	Loughborough University
Address	Ashby Road Loughborough Leics LE11 3TU UK
Job Title	Lecturer in Radiochemistry
Areas Of Interest	Migration of radionuclides in the environment Effect of orgaincs, natural and anthroprogenic, on radionuclide transport
Latest Publications	Muhammad Haleem Khan, Peter Warwick and Nick Evans, Spectrophotometric Determination of Uranium with Arsenazo-III in Perchloric Acid, Chemosphere, 63, 2006, p 1165 Peter Warwick, Nick Evans and Sarah Vines, Studies on some divalent Metal a-Isosaccharinic Acid Complexes, Radiochimica Acta, 94(6-7), 2006, pp 363-369. S. Aldridge, P. Warwick, N. Evans and S. Vines., Degradation of tetraphenylphosphonium bromide at high pH and its effect on radionuclide solubility, Chemosphere, 66(4), 2007, pp

Nucleonica Wiki…

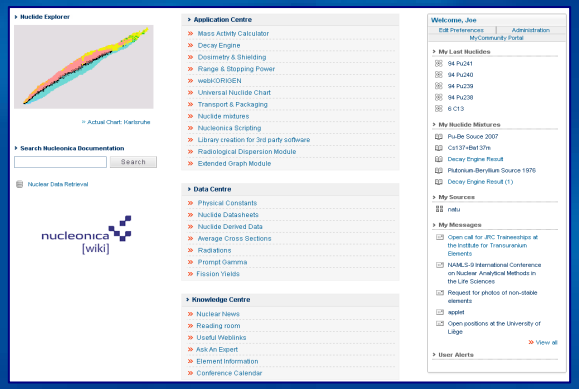


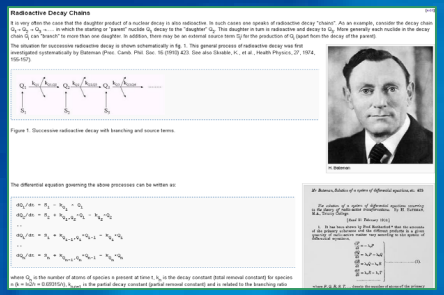
Nuclear Science Data & Applications

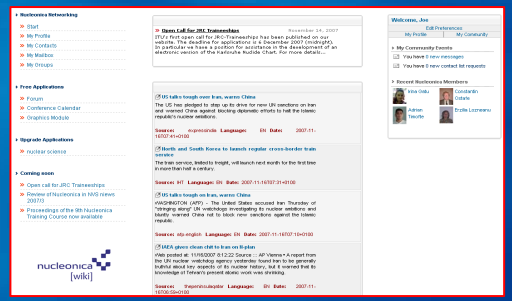
Nucleonica Wiki (CMS)

Networking with Nucleonica

Training Courses







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Nuclear science applications…

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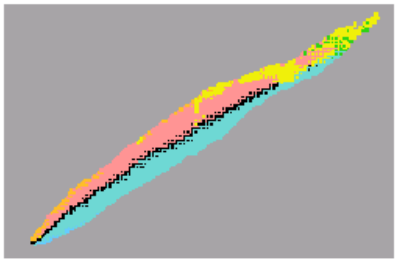
Applications | My Preferences | Help

Nuclide Explorer



» Actual Chart: Karlsruhe

Search Nucleonica Documentation

Search

Nuclear Data Retrieval

nucleonica [wiki]

Application Centre

- Mass Activity Calculator
- Decay Engine
- Dosimetry & Shielding
- Range & Stopping Power
- webKORIGEN
- Universal Nuclide Chart
- Transport & Packaging
- Nuclide mixtures
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- Gamma Spectrum Generator (IE only)
- easy Monte Carlo (IE only)
- Extended Graph Module

Data Centre

- Physical Constants
- Nuclide Datasheets
- Nuclide Derived Data
- Average Cross Sections
- Radiations
- Prompt Gamma
- Fission Yields

Knowledge Centre

- Nuclear News
- Reading room
- Useful Weblinks
- Ask An Expert

Welcome, Joe

Edit Preferences | Administration

MyCommunity Portal

My Last Nuclides

- 63 Eu152
- 84 Po210
- 27 Co60
- 37 Rb98
- 37 Rb88

My Nuclide Mixtures

- Natural Thorium
- Natural Uranium
- U232+Co60
- Cs137 + Ba137m
- Depleted Uranium (0.4%U235)

My Sources

- Pu239 1 g
- natu

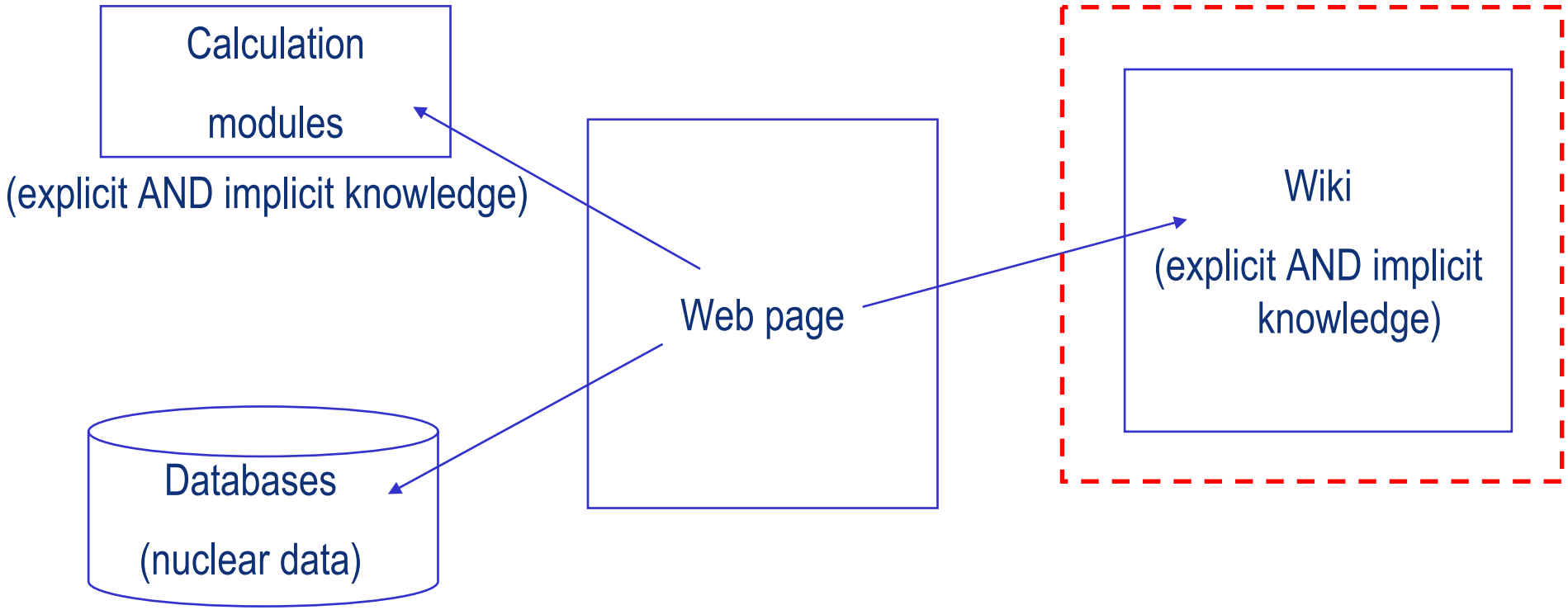
My Messages

No messages for you at the moment

User Alerts

No alerts at the moment

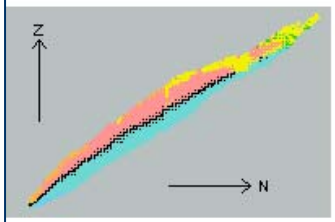
Nucleonica Architecture & Logical Structure…



The NUCLEONICA Structure

nucleonica ... web driven nuclear science

Views Applications My Preferences Help



Select

Element: Mass:

None None

Zoom

View:

User defined

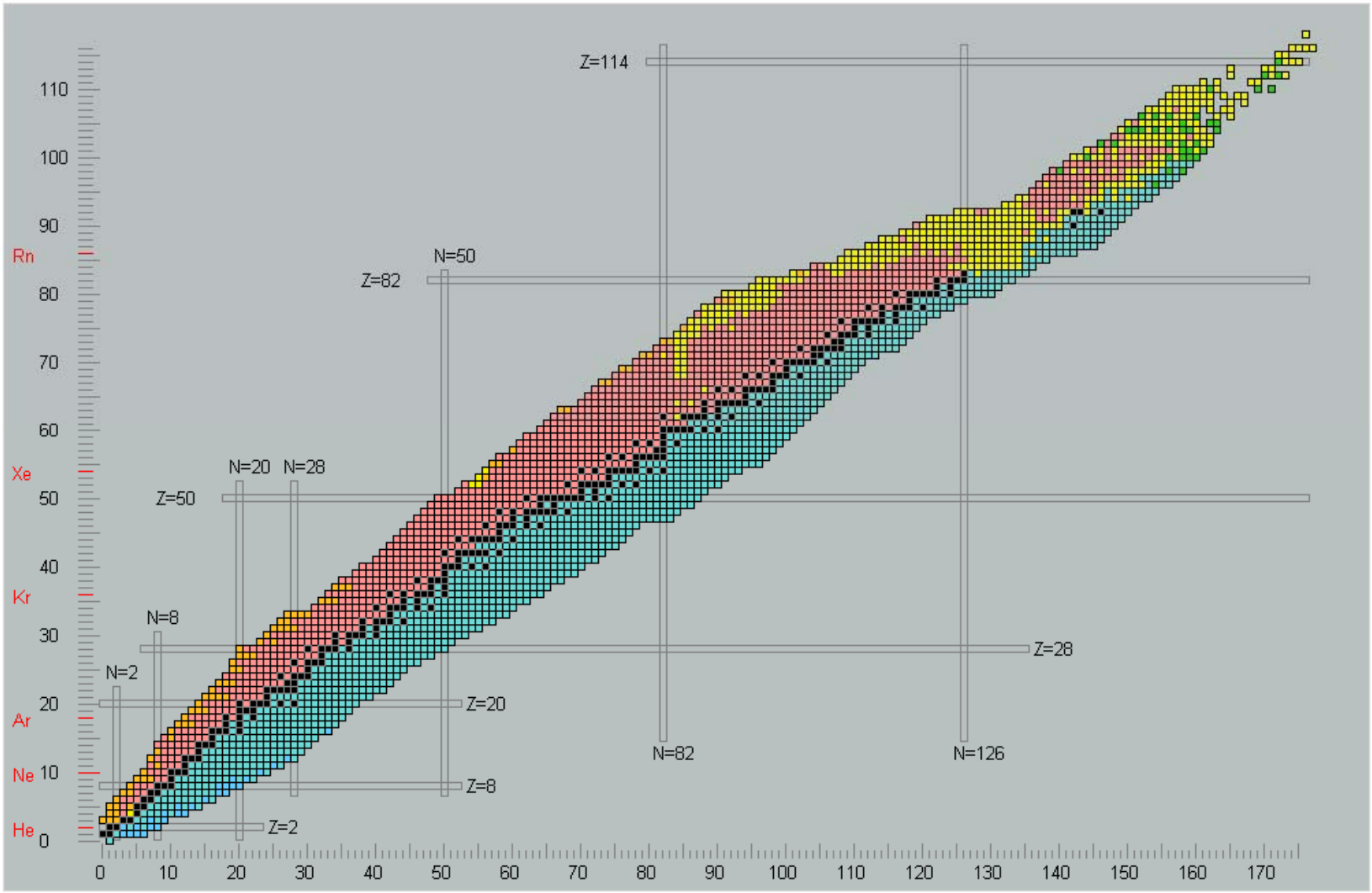
Select colour theme:

Karlsruhe

- alpha
- beta⁻
- ec/beta⁺
- IT
- n
- SF
- p
- ec
- CE
- stable

All None

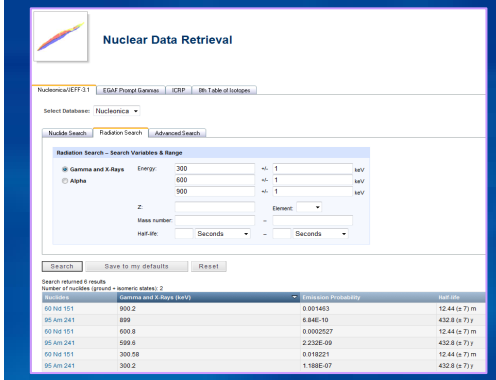
Background

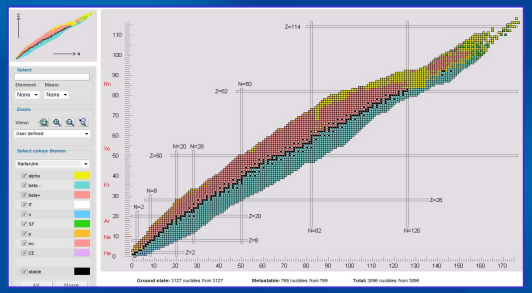


Ground state: 3127 nuclides from 3127 **Metastable:** 769 nuclides from 769 **Total:** 3896 nuclides from 3896

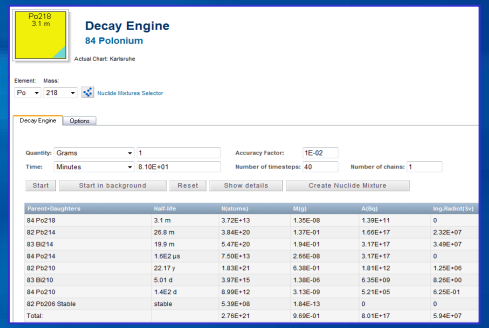
Nuclear science portal …

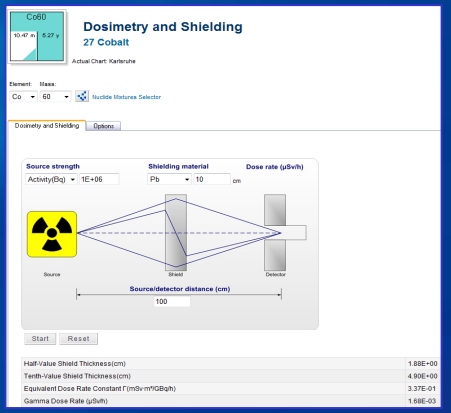
Data centre…

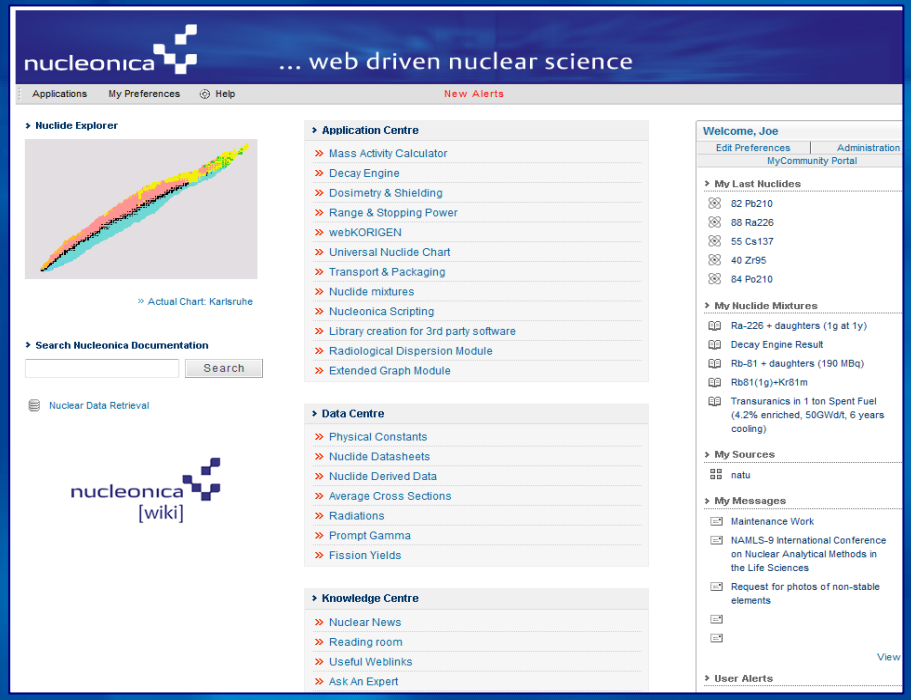




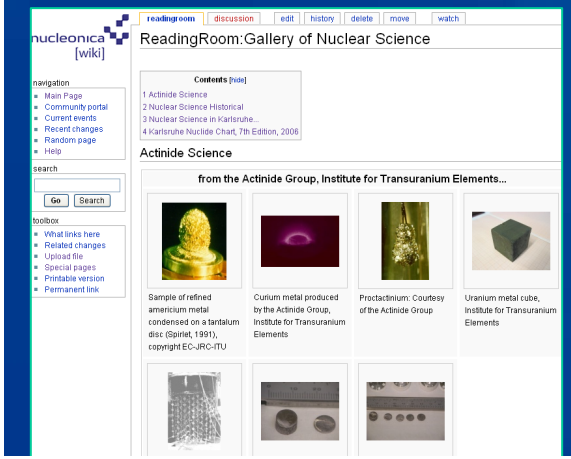
Applications centre…



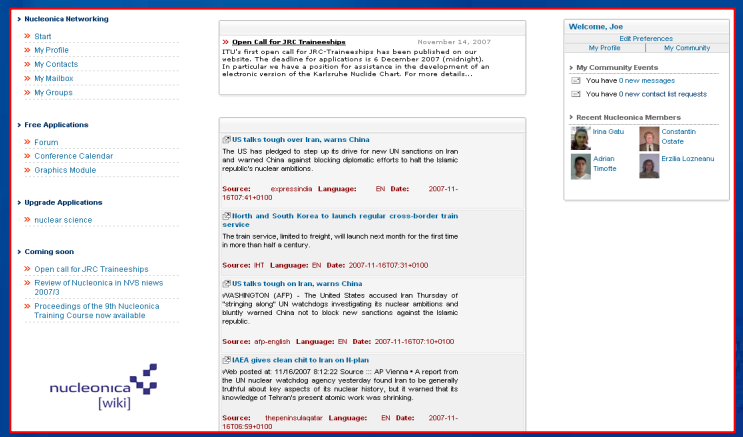


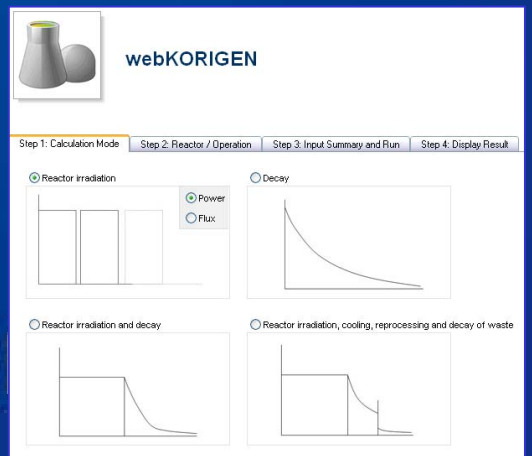


Knowledge centre…



Networking centre…





Powerful tools…

Nuclear Data Retrieval

Nucleonica/JEFF-3.1 | EGAF Prompt Gammas | ICRP | 8th Table of Isotopes

Select Database: Nucleonica

Nuclide Search | Radiation Search | Advanced Search

Radiation Search – Search Variables & Range

Gamma and X-Rays / Alpha

Energy: 300 +/- 1 keV; 600 +/- 1 keV; 900 +/- 1 keV

Z: Element:

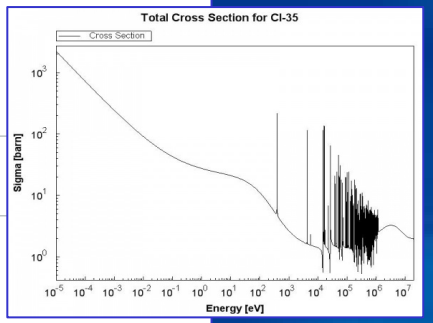
Mass number: –

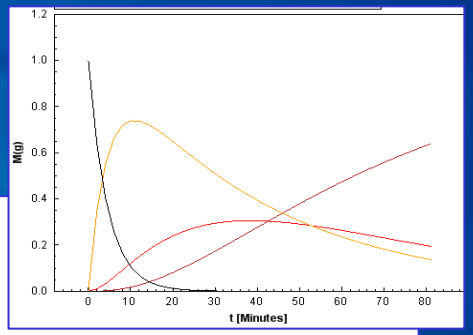
Half-life: Seconds – Seconds

Search | Save to my defaults | Reset

Search returned 6 results
Number of nuclides (ground + isomeric states): 2

Nuclides	Gamma and X-Rays (keV)	Emission Probability	Half-life
60 Nd 151	900.2	0.001463	12.44 (± 7) m
95 Am 241	899	6.84E-10	432.8 (± 7) y
60 Nd 151	600.8	0.0002527	12.44 (± 7) m
95 Am 241	599.6	2.232E-09	432.8 (± 7) y
60 Nd 151	300.58	0.018221	12.44 (± 7) m
95 Am 241	300.2	1.188E-07	432.8 (± 7) y





Decay Engine

Po218 3.1 m

84 Polonium

Actual Chart: Karlsruhe

Element: Po Mass: 218 Nuclide Mixtures Selector

Decay Engine | Options

Quantity: Grams 1 Accuracy Factor: 1E-02

Time: Minutes 8.10E+01 Number of timesteps: 40 Number of chains: 1

Start | Start in background | Reset | Show details | Create Nuclide Mixture

Parent+Daughters	Half-life	N(atoms)	M(g)	A(Bq)	Ing.Radiot(Sv)
84 Po218	3.1 m	3.72E+13	1.35E-08	1.39E+11	0
82 Pb214	26.8 m	3.84E+20	1.37E-01	1.66E+17	2.32E+07
83 Bi214	19.9 m	5.47E+20	1.94E-01	3.17E+17	3.49E+07
84 Po214	1.6E2 µs	7.50E+13	2.66E-08	3.17E+17	0
82 Pb210	22.17 y	1.83E+21	6.38E-01	1.81E+12	1.25E+06
83 Bi210	5.01 d	3.97E+15	1.38E-06	6.35E+09	8.26E+00
84 Po210	1.4E2 d	8.99E+12	3.13E-09	5.21E+05	6.25E-01
82 Pb206 Stable	stable	5.39E+08	1.84E-13	0	0
Total:		2.76E+21	9.69E-01	8.01E+17	5.94E+07

Dosimetry and Shielding

Co60 10.47 m 5.27 y

27 Cobalt

Actual Chart: Karlsruhe

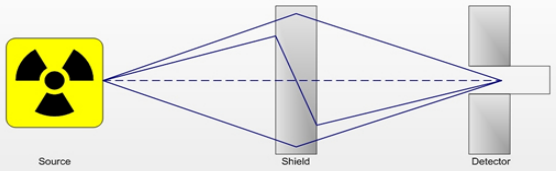
Element: Co Mass: 60 Nuclide Mixtures Selector

Dosimetry and Shielding | Options

Source strength: Activity(Bq) 1E+06

Shielding material: Pb 10 cm

Dose rate (µSv/h)



Source/detector distance (cm): 100

Start | Reset

Half-Value Shield Thickness(cm)	1.88E+00
Tenth-Value Shield Thickness(cm)	4.90E+00

nucleonica

October 2007 Karlsruhe

[edit]

9th Nuclear Science Training Course with Nucleonica, 25/26th Oct. 2007, Ostendorfhaus, Karlsruhe

The 9th Nuclear Science training course on Radioactivity, Radionuclides and Radiation with Nucleonica was held at the Ostendorfhaus, Karlsruhe from the 25th to 26th October, 2007. The two-day course provided a general introduction to the recently released Nucleonica: the new science networking and applications portal. Nucleonica is a powerful and versatile web-based software package for the nuclear science community. With examples and exercises, a variety of core and topical issues in nuclear science and technology were presented by experts in their respective fields.

A total of twenty-nine participants, around half of them women, with a diverse range of backgrounds attended the course. There were participants from Azerbaijan, Belgium, Bulgaria, Czech Republic, Poland, Romania and Turkey. In addition there were 10 participants form the Institute for Transuranium Elements. Among them were students, academics and industry professionals from fields such as nuclear medicine, radiation protection, environmental radioactivity and reactor physics.

Final Agenda 25th Oct. 2007

How to get from the hotel to the conference training centre

Links to the presentations and exercises:

Networking with Nucleonica (J. Magill) Exercises

Nuclear Data (J. Galy) Exercises

Nuclide Charts (C. Normand) Exercises

Decay Engine (A. Berlizov) Exercises

Dosimetry & Shielding (J. Galy) Exercises

Nuclear Forensics & Illicit Trafficking (K. Mayer) Exercises

Overview of the Institute for Transuranium Elements (F. Wastin)

Advanced Nucleonica Features (J. Magill)

Training Course Feedback

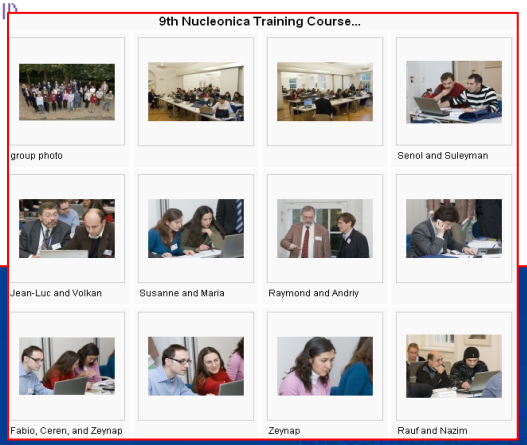
QM Questionnaire

Course Certificate

List of Participants

Gallery

Group Photo Oct. 2007, Ostendorfhaus Karlsruhe



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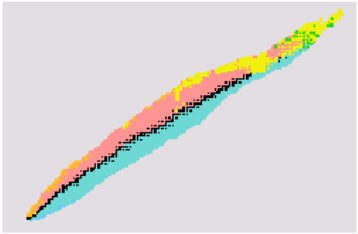
Nuclear science applications…

nucleonica … web driven nuclear science

Applications | My Preferences | Help

Nuclide Explorer



» Actual Chart: Karlsruhe

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Nuclear Data Retrieval

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Application Centre

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- Radiations
- Prompt Gamma
- Fission Yields

Knowledge Centre

- Nuclear News
- Reading room
- Useful Weblinks
- Ask An Expert
- Element Information
- Conference Calendar

Welcome, Joe

Edit Preferences | Administration

MyCommunity Portal

My Last Nuclides

- 90 Th232
- 90 Th231
- 94 Pu239
- 92 U235
- 25 Mn52

My Nuclide Mixtures

- Pu238+daughter (100g @50y)
- Natural Uranium
- Cs137 + Ba137m
- U232+Co60
- Transuranics in 1 ton Spent Fuel (4.2% enriched, 50GWd/t, 6 years cooling)

My Sources

- Pu239 1 g
- natu

My Messages

- Thanks!
- About my group and information
- Photo Change
- Open call for JRC Traineeships at the Institute for Transuranium Elements
- NAMLS-9 International Conference on Nuclear Analytical Methods in the Life Sciences

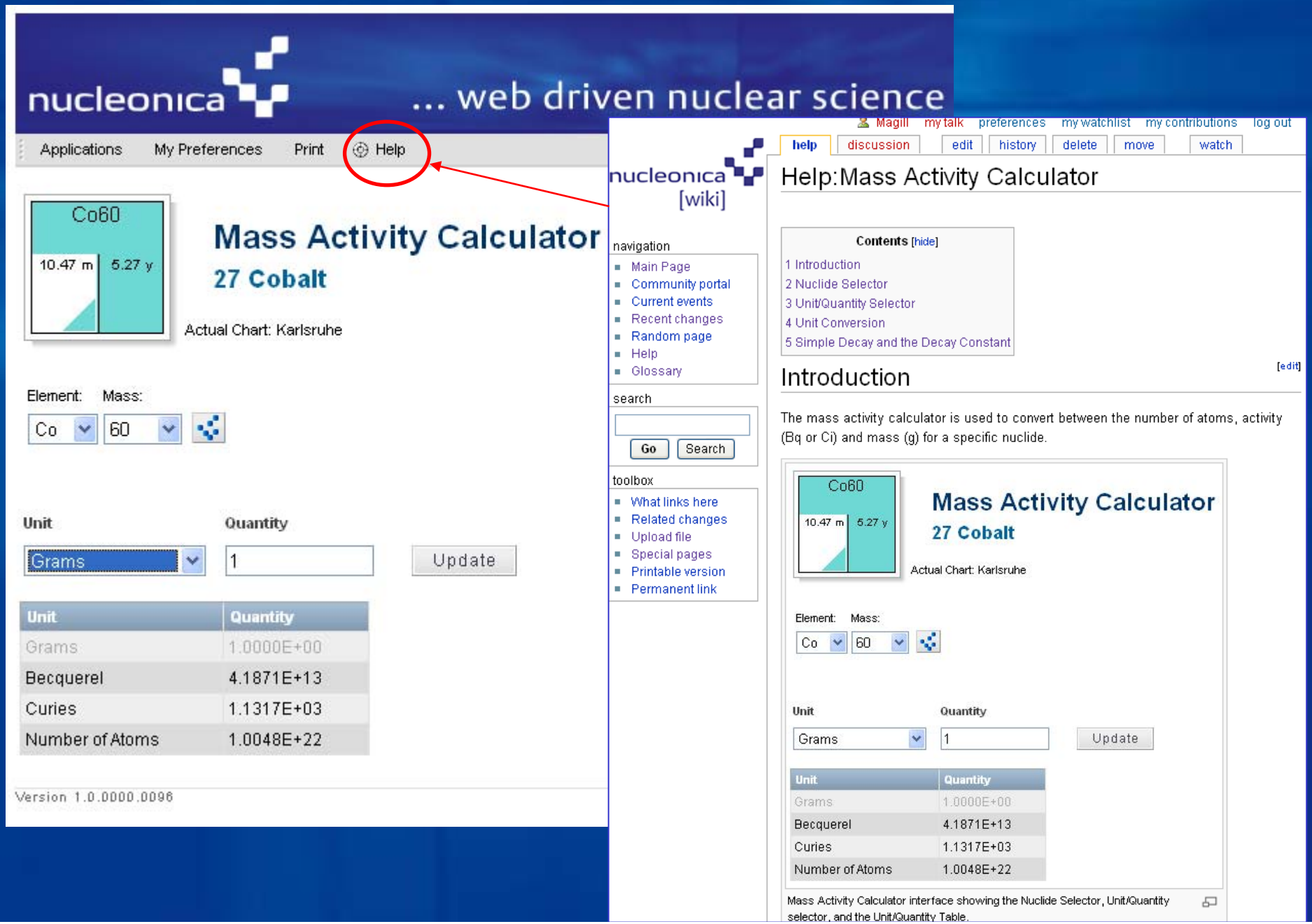
» View

User Alerts

- Task completed (DecayEngine: Uranium 238)

» View

Example of a simple NUCLEONICA application: The Mass-Activity Calculator



Example of a simple NUCLEONICA application:

The Mass-Activity Calculator:

Unit Conversion [edit]

The conversion from mass to number of atoms N, and vice versa, is obtained using

$$N = Mass(g) \cdot N_A/M$$

where N_A is Avogadro's number, M is the atomic mass of the nuclide. The conversion from number of atoms to activity, and vice versa, is obtained using

$$Activity(Bq) = k \cdot N = ln2 \cdot N/\tau$$

$$Activity(Ci) = Activity(Bq)/3.7 \cdot 10^{10}$$

where k, and τ are the decay constant and half-life respectively of the nuclide. It follows that the relation between activity and mass is given by

$$Activity(Bq) = (ln2/\tau) \cdot Mass(g) \cdot N_A/M$$

Simple Decay and the Decay Constant [edit]

For simple radioactive decay processes in which a parent nuclide decays and there is no source term for the production of the parent, the equation for radioactive decay is given by:

$$dN/dt = -kN$$

where N is the number of atoms at time t and k is the decay constant. The Activity is the number of disintegrations per unit time i.e. $Activity = -dN/dt = kN$. The decay constant is related to the half-life τ through the relation

$$k = ln2/\tau \approx 0.693/\tau$$

It follows that the number of atoms as a fuction of time is given by

$N(t) = N(0) \cdot e^{-kt}$ or alternatively $N = N(0) \cdot \left(\frac{1}{2}\right)^{t/\tau}$

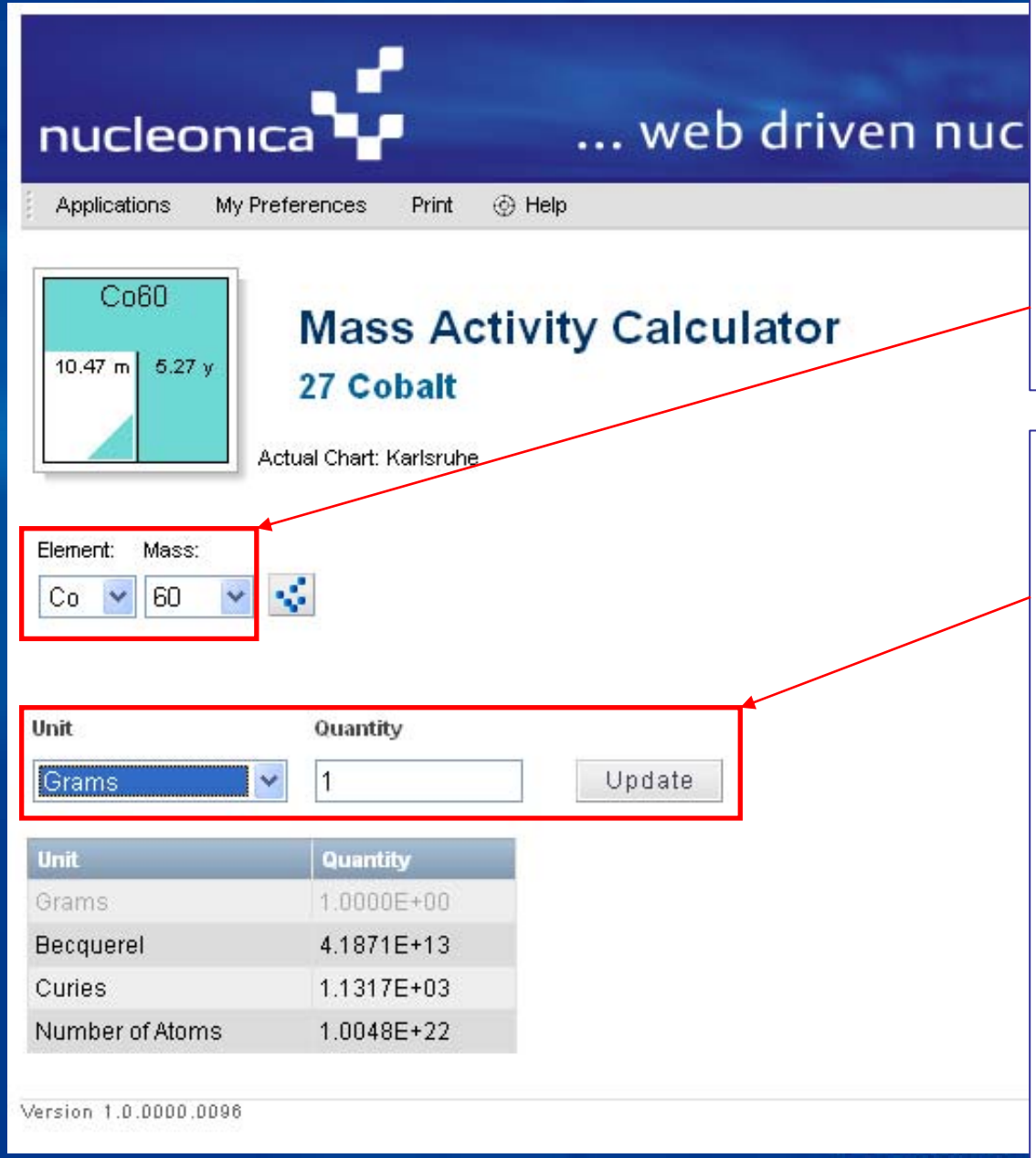
and the activity as a function of time is given by

$Activity(t) = Activity(0) \cdot e^{-kt}$ or altrnatively

$Activity(t) = Activity(0) \cdot \left(\frac{1}{2}\right)^{t/\tau}$

The expressions involving the term $\left(\frac{1}{2}\right)^{t/\tau}$ are useful for calculating directly with the decay time t and the half-life τ.

Example of simple NUCLEONICA application:



Nuclide Selector

[edit]

In the Mass Activity Calculator, the nuclide Co-60 is selected by default. A different nuclide can be selected from the element and mass drop-down menus. The default source strength is 1 gram. In the Unit/Quantity table, this source strength is shown in Becquerel (Bq), Curie (Ci), Number of Atoms. Hence 1 g Co-60 corresponds to a source strength of 4.187E13 Bq, 1.132E3 Ci or 1.005E22 atoms.

Element: Mass:

Co 60

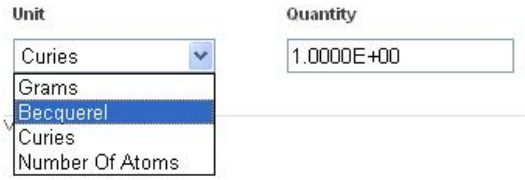
Nuclide Chart Button:

shows the location of the selected nuclide on the nuclide chart.

Unit/Quantity Selector

[edit]

The input unit can be changed in the Unit drop down menu. The default value is 1 gram. Had the value 1 Curie been selected, on pressing the Update button, the corresponding values in grams, Bq, number of atoms are shown in the Unit/Quantity table.



Unit/Quantity Table

Once the unit and quantity have been selected in the Unit/Quantity Selector, the source strength in other units is given in the Unit/Quantity table, by pressing the update button. In the table below, results are shown for 1 Ci Co-60.

Unit	Quantity
Grams	8.8366E-04
Becquerel	3.7000E+10
Curies	1.0000E+00
Number of Atoms	8.8790E+18

Highlight:

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Step 1: Calculation Mode | Step 2: Reactor / Operation | Step 3: Input Summary and Run | Step 4: Displ

- Reactor irradiation (Power / Flux)
- Decay
- Reactor irradiation and decay
- Reactor irradiation, cooling, reprocessing and decay

webKORIGEN

Step 1: Calculation Mode | Step 2: Reactor / Operation | Step 3: Input Summary and Run | Step 4: Display Result

Display Results at 6 y for most important nuclides

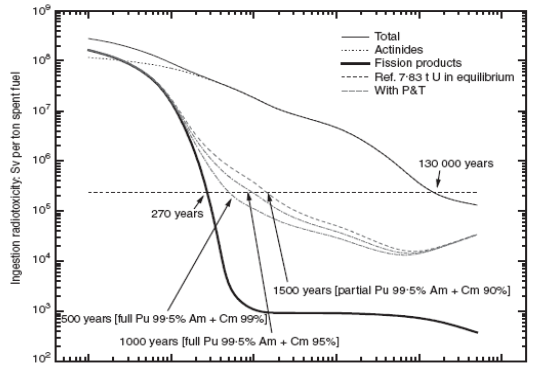
Display quantity: Activity (Bq)

Top Nuclides	Results	Top Elements	Results	Totals	Results
Cs137	1.095E+17	Cesium	1.401E+17	Actinides:	1.130E+17
Ba137m	1.036E+17	Plutonium	1.054E+17	Fission Prod.	4.670E+17
Pu241	9.937E+16	Barium	1.036E+17	Total	5.800E+17
Y90	7.129E+16	Yttrium	7.129E+16		
Sr90	7.127E+16	Strontium	7.127E+16		
Cs134	3.065E+16	Promethium	2.917E+16		
Pm147	2.917E+16	Europium	1.209E+16		
Eu154	9.611E+15	Ruthenium	9.449E+15		
Rh106	9.449E+15	Rhodium	9.449E+15		
Ru106	9.449E+15	Krypton	7.199E+15		
Kr85	7.199E+15	Curium	6.249E+15		
Cm244	6.205E+15	Praseodymium	4.031E+15		
Pu238	5.291E+15	Cerium	3.983E+15		
Ce144	3.983E+15	Antimony	3.670E+15		
Pr144	3.983E+15	Americium	1.313E+15		
Sb125	3.669E+15	Tellurium	8.950E+14		
Eu155	2.477E+15	Neptunium	4.048E+13		
Am241	1.259E+15				
Te125m	8.950E+14				
Pu240	4.933E+14				

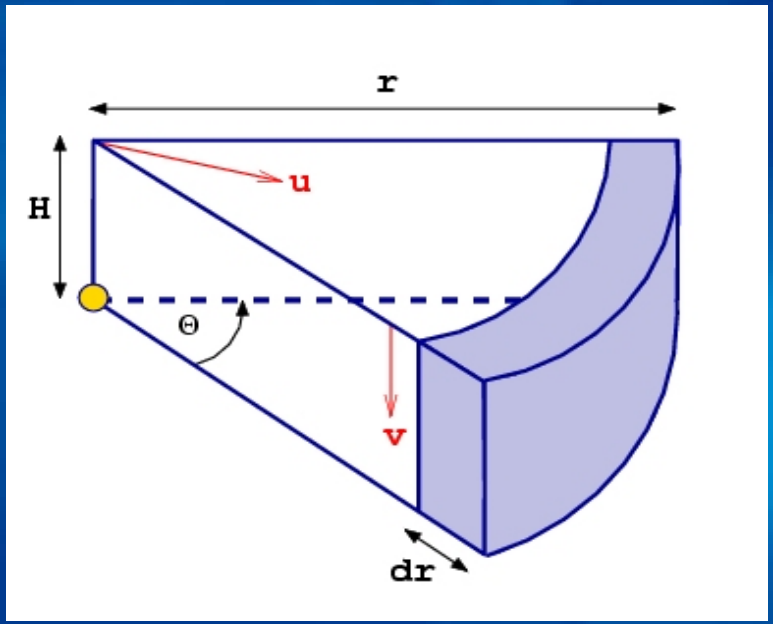
Neutron and gamma rates

Neutron rate: 2.491E+10 n/s

Gamma rate from Actinides: 6.427E+13 MeV/s



RDD module development within Nucleonica.



Modelling Activities:
Radiological consequences of an RDE involving radioactive and nuclear materials with the Wedge model.

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Applications | My Preferences | Print | Help

Radiological Dispersion Module

Cobalt

Radionuclide: Co-60-0

Input | Wedge Snapshot

Material (Update)

Quantity	20000	Ci
Effective Dose Coefficient	3.100E-08 Sv/Bq	
Activity	4.187E+13 Bq/g	
Mass	1.767e+01 g	
Wedge at	1000	
Population density	2600	per km^2

Meteorology

Cloud height	50	m
Deposition velocity	0.03	m/s
Wind velocity	5	m/s
Opening angle	12	degrees
Acute Effect Dose Limit	5	Sv

Run

Results

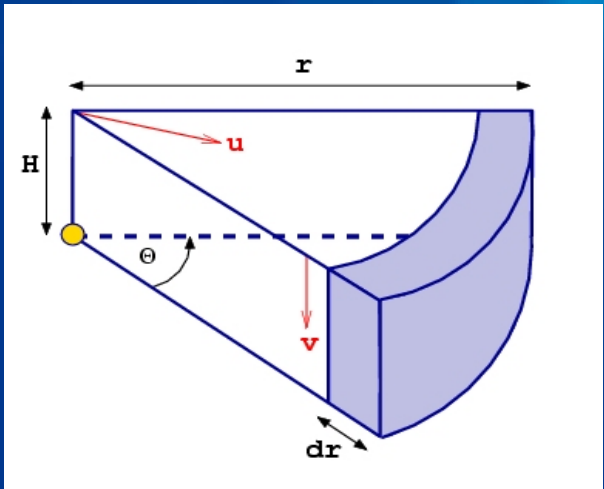
Distance [km]	Dose [mSv]	Time [min]
0.012	5000	0.039
0.059	1000	0.196
0.193	300	0.643
0.555	100	1.848
1.625	30	5.418
3.770	10	12.567
7.773	3	25.910
12.783	1	42.610
19.358	0.3	64.526

Summary

Characteristic Aerosol Range	8.33E+00	km
Characteristic Aerosol Lifetime	4.63E-01	h
Total intake activity by inhalation	8.66E+09	Bq
Collective Dose (<5.00 Sv)	2.69E+02	man·Sv
Number of exces cancers	13	
Number of Acute Effects	0	
Acute Effect Distance	1.18E-02	km
Acute Effect Time	3.94E-02	min

- Modelling Activities: Radiological consequences of an RDE involving radioactive and nuclear materials.

Comparison of simple analytical models (WEDGE) and complex codes (LASAIR)



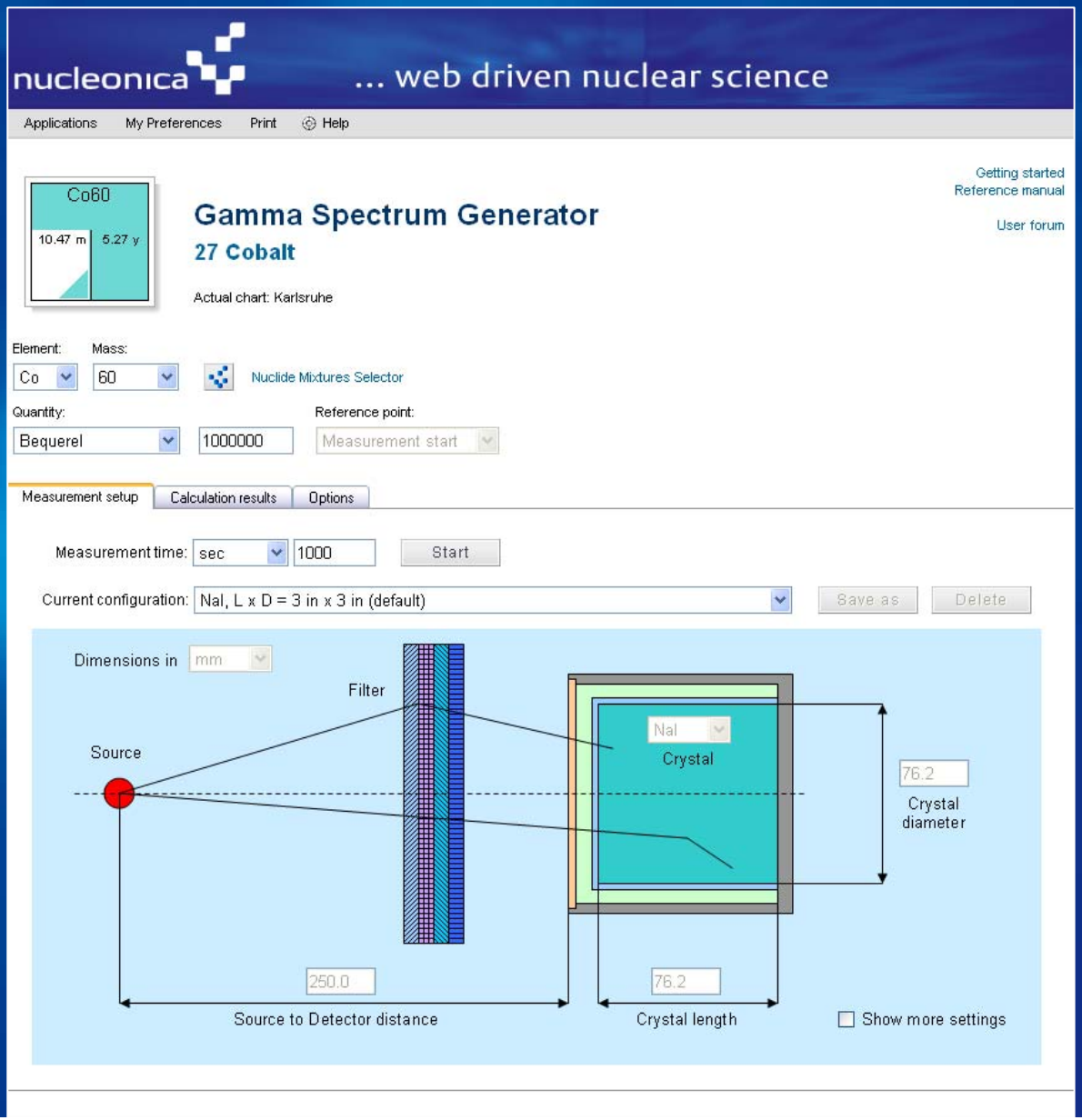
Gamma Spectrum Generator… can be used to simulate the gamma spectrum of radioactive substances with a variety of detectors (e.g. NaI, HPGe). The simulator presents an efficient visual teaching aid that is especially useful in training facilities which have restrictions on the use of radioactive substances, or when sources of special interest are not available.

of interests for…

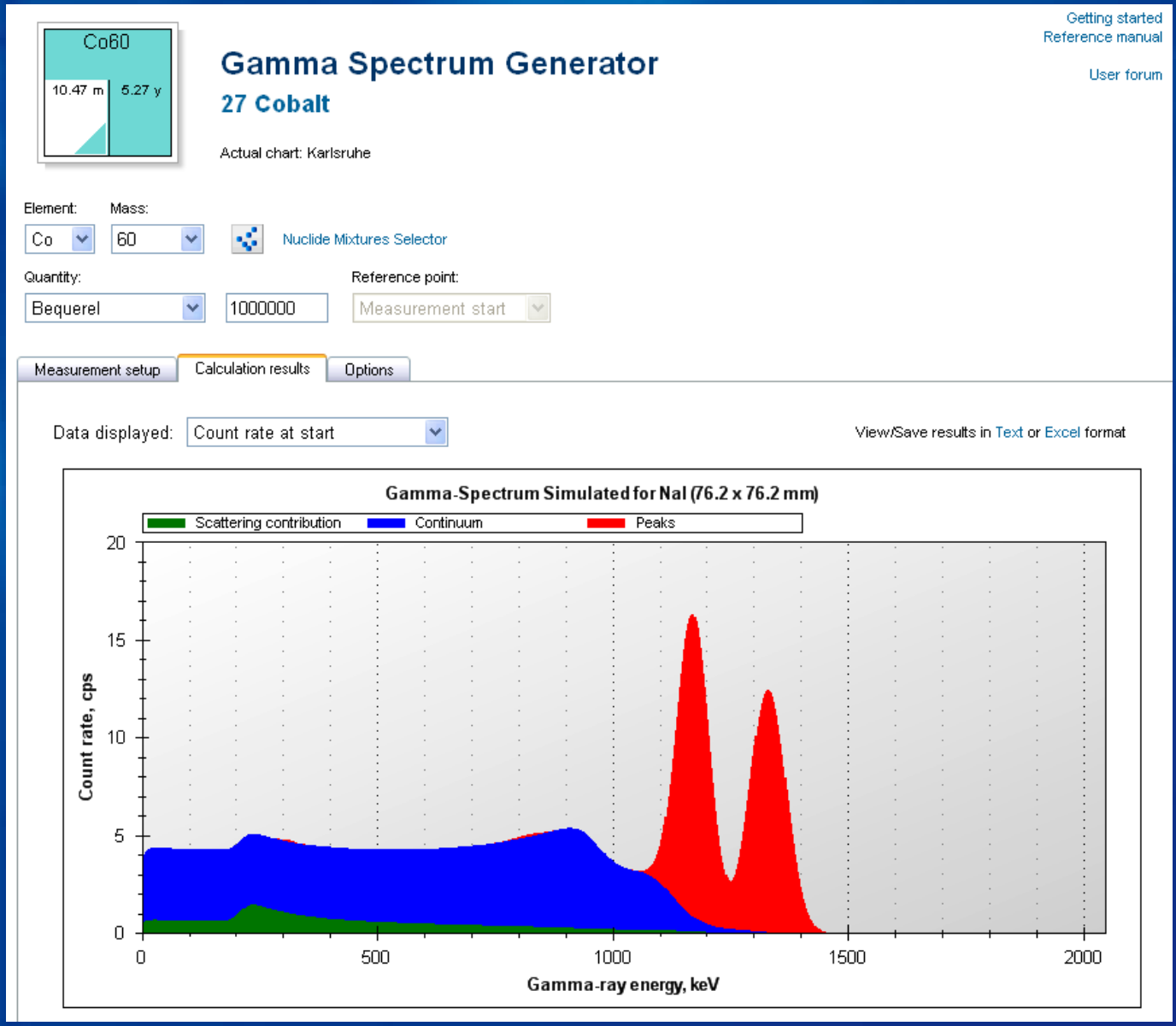
- nuclear and radio-chemists,
- health physicists,
- nuclear facility operators,
- radiation protection staff,
- safeguards inspectors,
- border police,
- customs and law-enforcement officers.

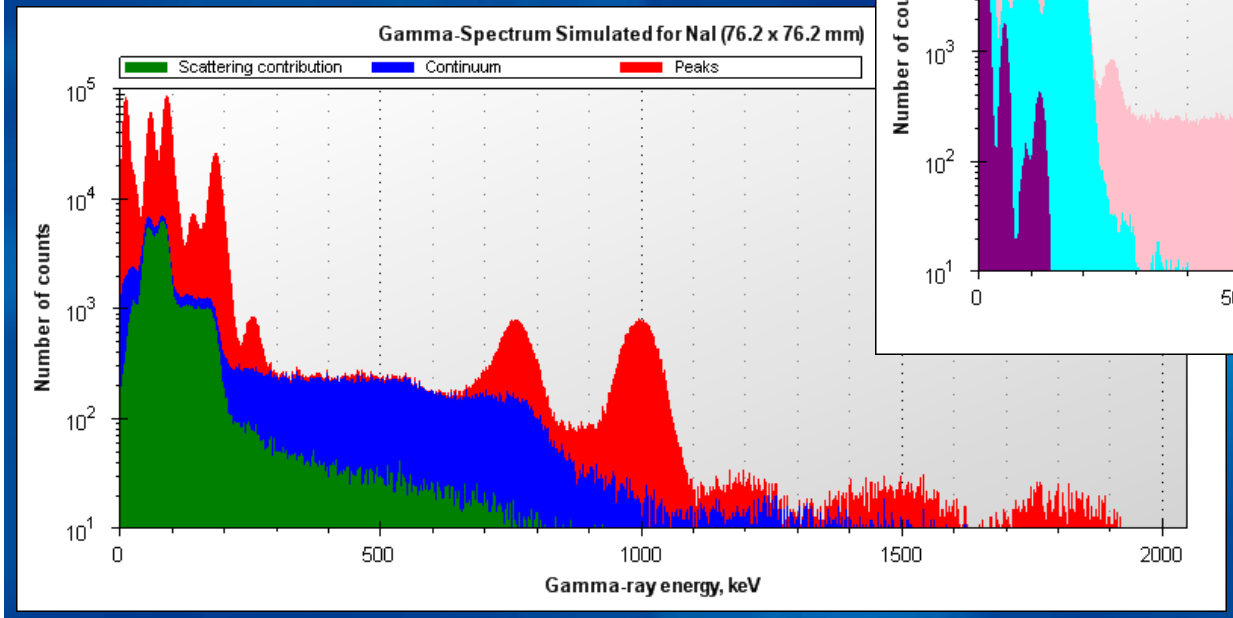
Needs for **Education & Training** in these areas are high and, obviously, they will be increasing in the future as new challenges arise, such as

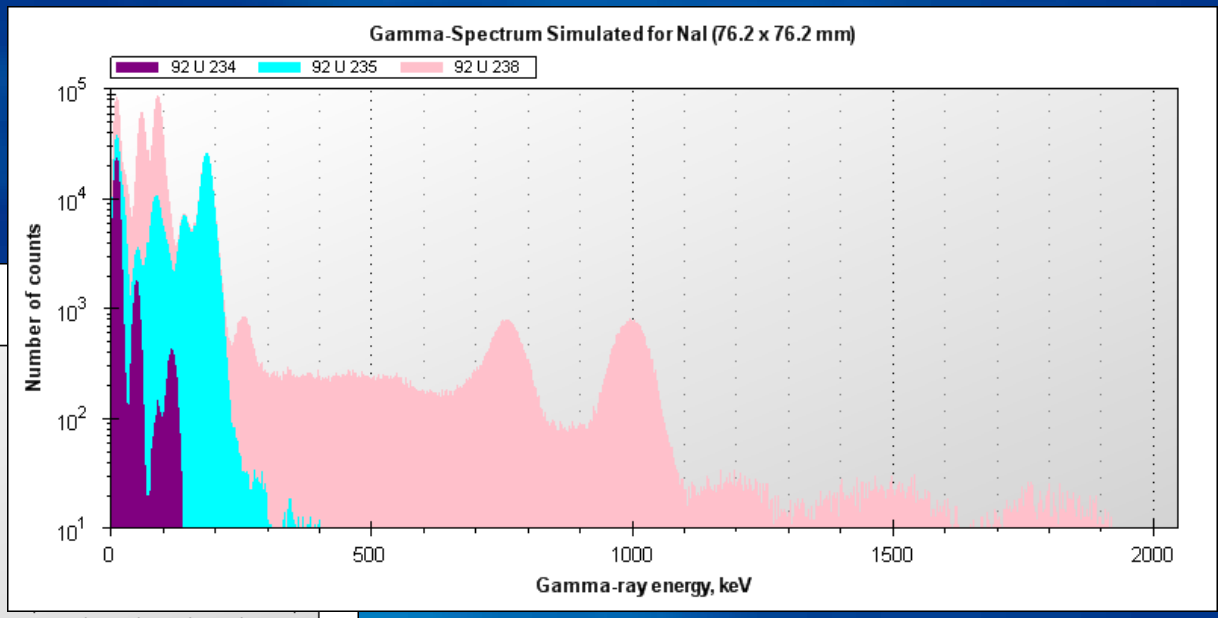
- strengthening international safeguards and security,
- nuclear terrorism prevention



This “one-click” calculation simulates the spectrum for a 10 MBq ^{60}Co γ-source located at 25 cm distance from unshielded 3" x 3" NaI detector. A typical result of the calculation is shown…







The *γ*-spectrum modelled for a 10-year-aged natural U sample and 3"×3" NaI detector. The two diagrams show different presentations of the same spectrum. The top diagram shows the separate contributions form the parent and daughters of U-234, U-235, U-238. The bottom diagram shows the contributions from the peak and continuum components of the spectrum.

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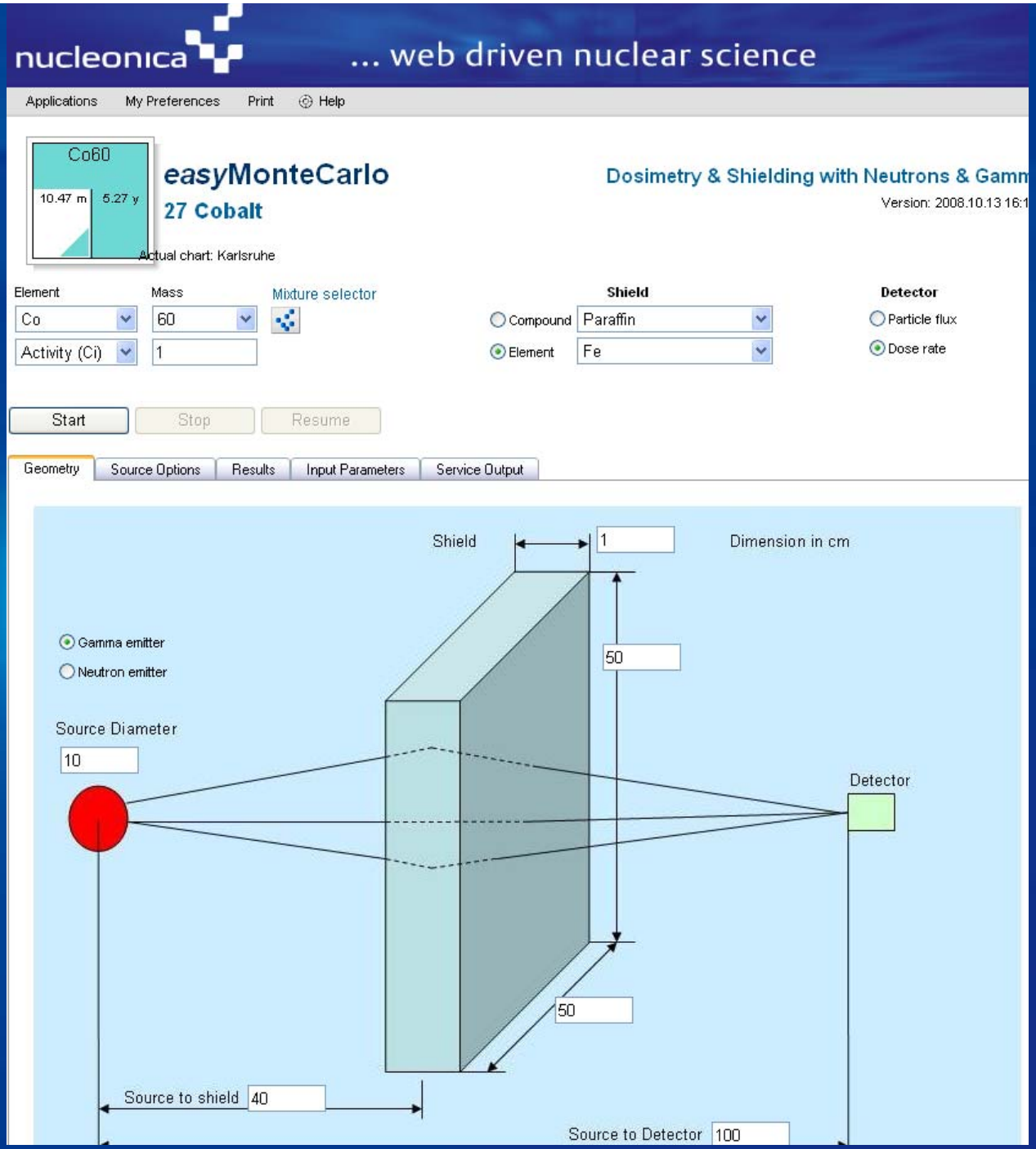
_easy_MonteCarlo:

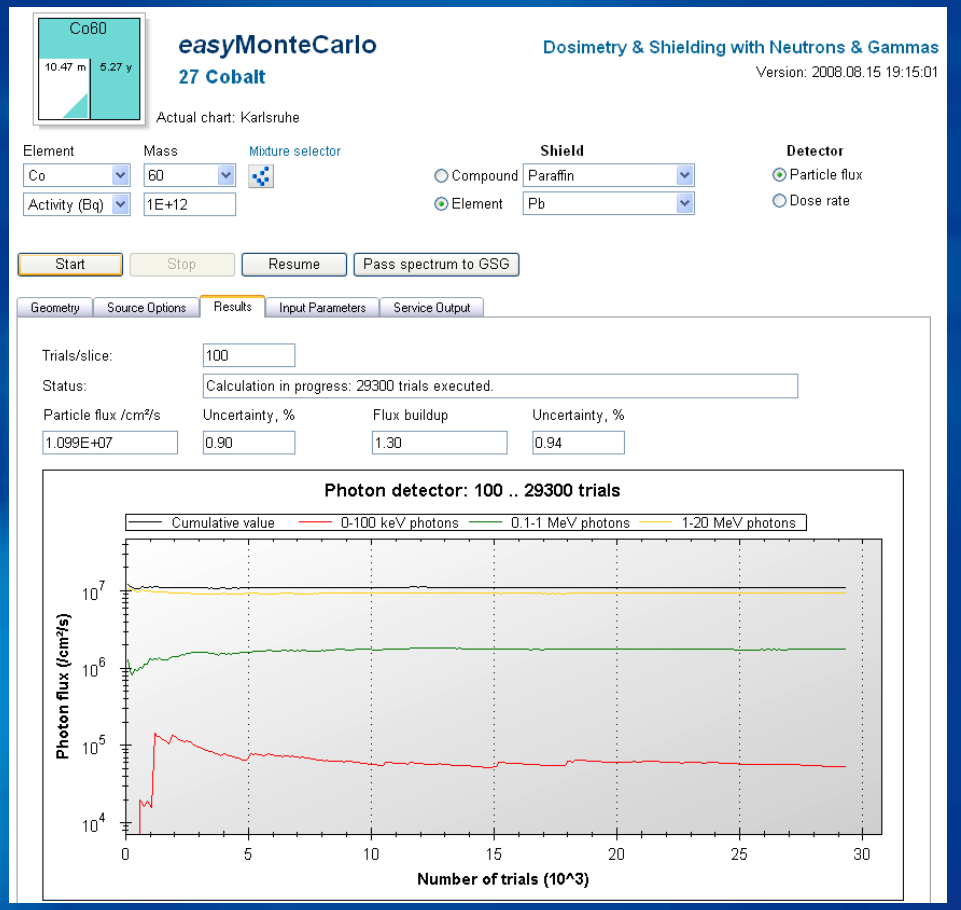
easy to use, fast, accurate dosimetry and shielding calculations for gammas and neutrons using Nucleonica's powerful Monte Carlo engine. Investigate the effects of self-attenuation in the source, build-up effects in the shield etc., on the dose rate and the particle flux distribution at the detector…

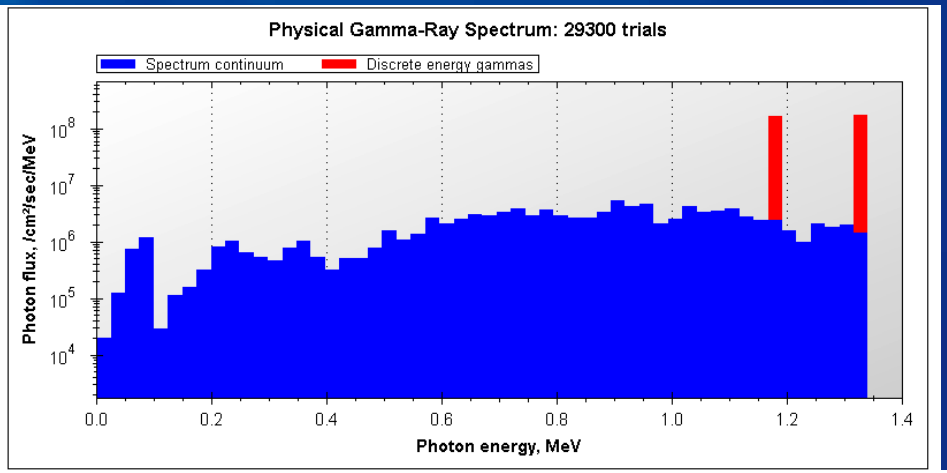
NUCLEONICA's *easyMonteCarlo* web-page showing the currently implemented shielding geometry…



easyMonteCarlo…

An example of the easyMonteCarlo calculation results is shown. The figure demonstrates the photon flux energy distribution from the ^{60}Co source with 10 cm × 50 cm × 50 cm iron shield. The source-to-shield and source-to-detector distances are 20 cm and 40 cm respectively. The contributions of the direct and scattered photons to the total flux are indicated on the graph by the red and blue columns respectively.

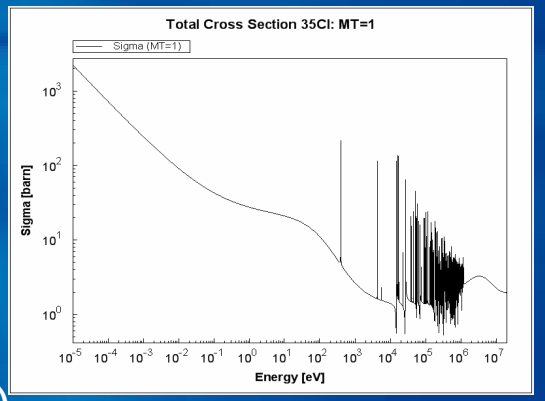


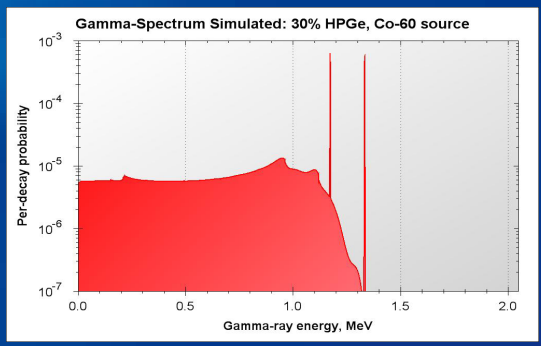


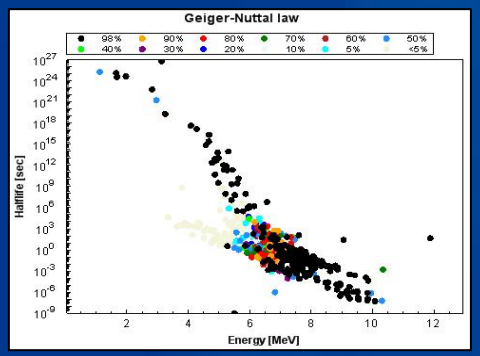
webGraphics…

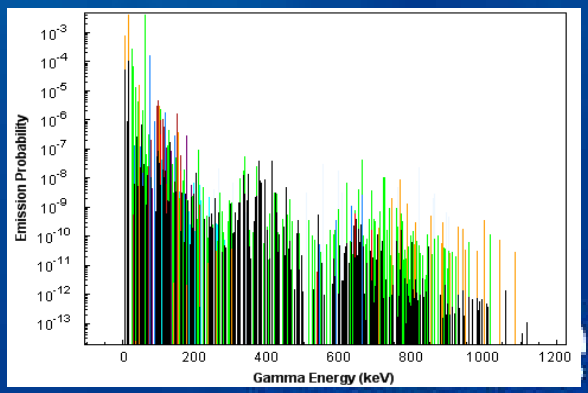
The Nucleonica webGraphics Features:

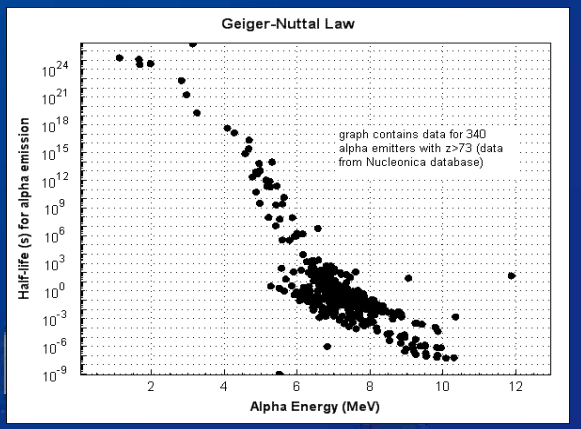
- No need to buy expensive commercial software
- Easy to use
- Delivers publication quality scientific graphs
- Variety of formats available (gif, jpg, emf, eps, png, svg)
- Graphics configuration can be stored for future use
- Available at any time from any location
- Under constant further development











Conclusions: Key Advantages of Nucleonica

- Keep informed with the latest news on nuclear issues
- Use internationally evaluated nuclear data in your work
- Extensive range of nuclear science applications
- Manage all your data in a single browser-based system and keep track of your recent activities
- Prepare a lecture or a training course with Nucleonica materials (graphics. etc.)
- Prepare publication quality scientific graphs
- Stay in contact with your colleagues from previous employment, workshops or conferences
- Meet scientists from your areas of interest and build up an international contact list and represent yourself and your Institute/Organisation in the international science community

nucleonica

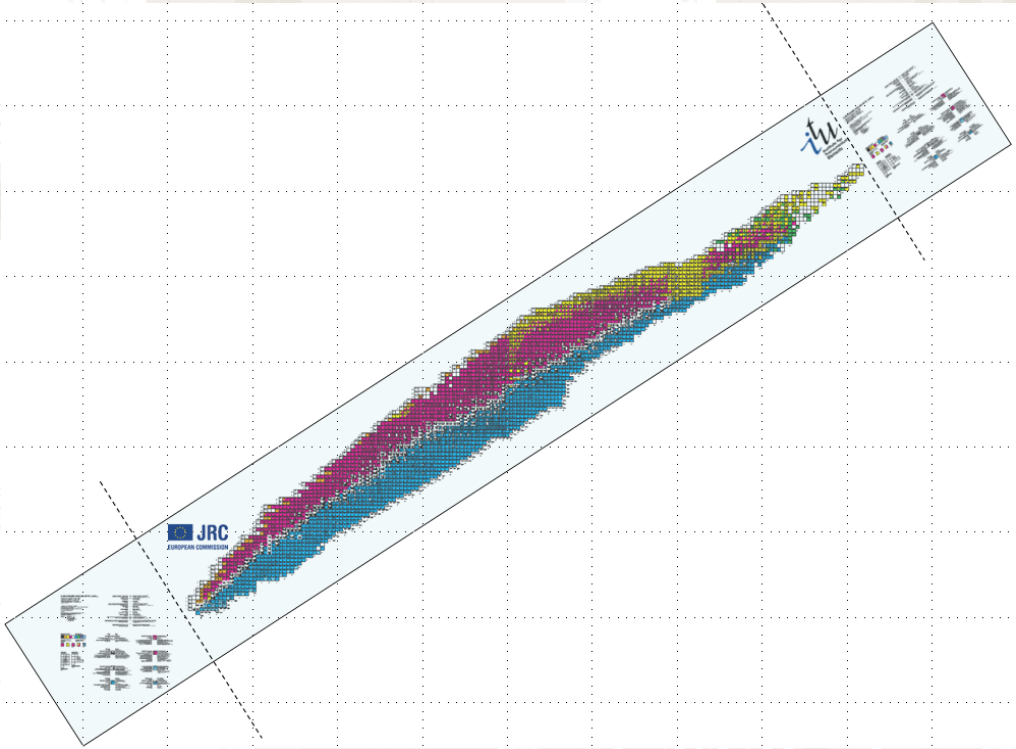
Karlsruhe Nuclide Chart

Fold-out Chart & Brochure:

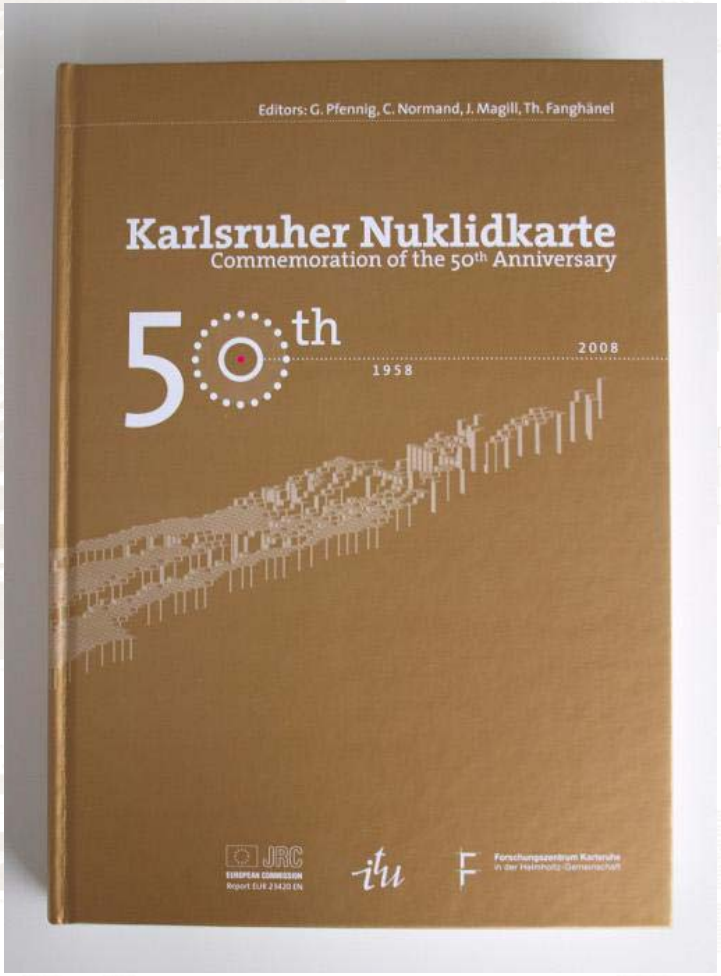
Wall-chart:

Karlsruhe Nuclide Chart

New: "Roll-Chart



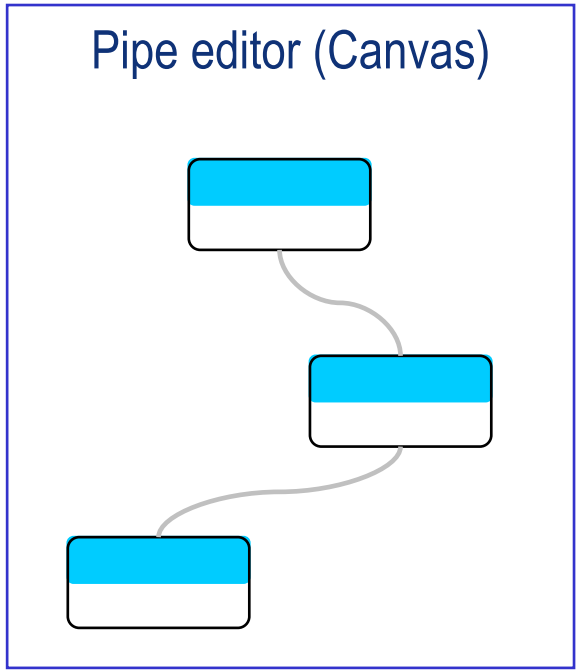
New Publication:

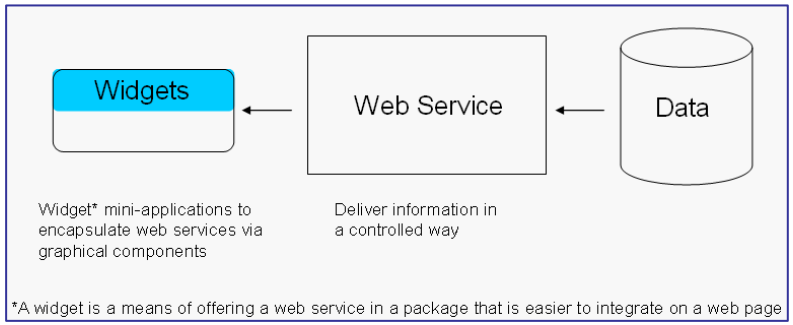


Long-term Vision…

ScencePipes

A New Approach to Knowledge Management, Education and Training based on Modular Web Services





- can be combined from other web services from any location (+)
- can only be called up from anywhere anytime (+)
- combining web services requires no programming knowledge(+)

NUCLEONICA:SNAP Science Networking and Applications Portal

1. What is Nucleonica? Underlying philosophy
2. Nucleonica web portal www.nucleonica.net
3. Social networking aspects
4. Nuclear science applications
5. Training courses
6. Karlsruhe Nuclide Chart
7. Future developments: SciencePipes

Next Course:

Training Course on Illicit Trafficking and Consequence Management with NUCLEONICA

April 22-24, 2009 at the Institute for Transuranium Elements, Karlsruhe Germany

For further information, see NUCLEONICA Wiki at:

http://www.nucleonica.net:81/wiki/index.php/Help:Training_Course_Announcements

Thanks!

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NUCLEONICA: A Platform for Knowledge Management, Education and Training

Types of Knowledge

It is generally accepted that different types of knowledge have very different characteristics. Explicit knowledge, for example, consists of facts, sets of instructions, etc. Implicit knowledge, on the other hand, is more related to know-how. These different types of knowledge have, of course, very different characteristics with regard, for example, to transferability. Explicit knowledge is transferable from person to person, across space and time. In contrast, tacit knowledge cannot be easily articulated and its transfer is slow and uncertain. As a consequence, explicit knowledge is not the basis of sustainable advantage over other organisations (except in the form of copyrights, patents, etc.). It is more the tacit knowledge that fits this role and this is notoriously difficult to transfer - even within the organization itself.

This is one of the greatest problems to be dealt with in knowledge management and is a constantly recurring problem. Within the Nucleonica nuclear science portal, we attempted to tackle this problem through the development of web-based scientific applications based for example on legacy computer codes. By developing user friendly web-applications (for example webKORIGEN) we aimed at opening up the use of this fuel cycle analysis computer code to a wider audience (through avoiding the time consuming tasks of obtaining such codes, compiling them, testing etc.). This application was then supported by a range of modern web networking features such a wiki, forum, questions and answers (Q/A), frequently asked questions (FAQs) etc. where users could interact with the developer(s) and the Nucleonica team.

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